

What is claimed is:

1. A stereo image processing apparatus subjecting image data obtained from a flying object (airframe) to stereo matching processing to generate three-dimensional data, comprising:
  - 5 data correcting means for correcting erroneous data to be corrected including at least noises and losses in said three-dimensional data by using information of external shape of buildings obtained from map data including said information of external shape.
- 10 2. The stereo image processing apparatus according to claim 1, wherein said data correcting means comprises:
  - registration means for superimposing said three-dimensional data on said map data;
  - area setting means for setting, for each building in the map data superimposed by said registration means,
    - 15 three-dimensional data included in the area within the external shape thereof as the candidate area of each building;
  - in-area histogram analysis means for obtaining, in each area set by said area setting means, statistic information from
    - 20 the three-dimensional data included in the area;
  - and data modifying means for modifying, based on the statistic information in each area obtained by said in-area histogram analysis means, three-dimensional data included in the area.

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*data* 3. The stereo image processing apparatus according to claim  
1 or 2, further comprising:  
image storing means for storing said image data.

4. The stereo image processing apparatus according to claim  
5 1, further comprising:  
map data storing means for storing said map data.

5. The stereo image processing apparatus according to claim  
4, further comprising:  
data storing means for storing modified three-dimensional  
10 data outputted from said data correcting means;  
data comparing means for comparing the three-dimensional  
data stored in said data storing means with the modified  
three-dimensional data outputted from said data correcting  
means; and  
15 map data modifying means for modifying the map data stored  
in said map data storing means based on differential information  
obtained from said data comparing means.

6. The stereo image processing apparatus according to claim  
1, wherein said flying object is an artificial satellite, and  
20 said image data is satellite image data obtained from said  
artificial satellite.

7. The stereo image processing apparatus according to claim  
1, wherein said flying object is an aircraft, and said image  
data is aircraft image data obtained from said aircraft.

area information extracting means for extracting at least  
5 area information of land use on the map of  
roads/railroads/rivers/sea from map data including at least  
information of external shape of buildings; and

9. The stereo image processing apparatus according to claim 8, wherein said data correcting means comprises:

area dividing means for setting, for each building in the map data superimposed by said registration means, three-dimensional data included in the area within the external shape thereof as the candidate area of each building and spatially dividing the three-dimensional data in accordance with the area information on said map data;

in-area histogram analysis means for obtaining, in each area set by said area setting means, statistic information from the three-dimensional data included in the area;

data modifying means for modifying, based on the statistic  
5 information in each area obtained by said in-area histogram  
analysis means and the modification conditions set by said  
modification condition setting means, the three-dimensional data  
included in the area.

image storing means for storing said image data.

map data storing means for storing said map data.

data comparing means for comparing the three-dimensional  
20 data stored in said data storing means with the modified  
three-dimensional data outputted from said data correcting  
means; and

map data modifying means for modifying the map data stored  
in said map data storing means based on differential information  
25 obtained from said data comparing means.

14. The stereo image processing apparatus according to claim 8, wherein said flying object is an aircraft, and said image data is aircraft image data obtained from said aircraft.

building external shape information detecting means for analyzing said image data to extract information of external shape of buildings; and

registration means for superimposing said  
three-dimensional data on information of external shape of  
buildings obtained from said building external shape information  
detecting means;

three-dimensional data included in the area within the external shape thereof as the candidate area of each building;

data modifying means for modifying, based on the statistic information in each area obtained by said in-area histogram analysis means, three-dimensional data included in the area.

image storing means for storing said image data.

19. The stereo image processing apparatus according to claim 15, wherein said flying object is an aircraft, and said image data is aircraft image data obtained from said aircraft.

20. An stereo image processing apparatus subjecting image data obtained from a flying object (airframe) to stereo matching processing to generate three-dimensional data, comprising:

building external shape information comparing/combining means for comparing and combining the external shape information obtained from map data including at least information of external shape of buildings with the external shape information extracted from said building external shape information detecting means; and

15    21. The stereo image processing apparatus according to claim  
20, wherein said data correcting means comprises:

20        area setting means for setting, for each building in the  
map data superimposed by said registration means,  
three-dimensional data included in the area within the external  
shape thereof as the candidate area of each building;

in-area histogram analysis means for obtaining, in each  
25 area set by said area setting means, statistic information from  
the three-dimensional data included in the area; and

22. The stereo image processing apparatus according to claim

image storing means for storing said image data.

map data storing means for storing said map data.

data storing means for storing modified three-dimensional  
data outputted from said data correcting means;

map data modifying means for modifying the map data stored in said map data storing means based on differential information obtained from said data comparing means.

25. The stereo image processing apparatus according to claim 20, wherein said flying object is an artificial satellite, and said image data is satellite image data obtained from said artificial satellite.



26. The stereo image processing apparatus according to claim 20, wherein said flying object is an aircraft, and said image data is aircraft image data obtained from said aircraft.

27. An stereo image processing apparatus subjecting image data  
5 obtained from a flying object to stereo matching processing to generate three-dimensional data, comprising:

area information extracting means for extracting at least  
area information of land use on the map of  
roads/railroads/rivers/sea from map data including at least  
10 information of external shape of buildings;

building external shape information detecting means for  
analyzing said image data to extract information of external  
shape of buildings;

building external shape information comparing/combining  
15 means for comparing and combining the information of external  
shape of buildings obtained from said map data with the information  
of external shape of buildings extracted by said building external  
shape information detecting means; and

data correcting means for correcting erroneous data to be  
20 corrected including at least noises and losses in said  
three-dimensional data by using the combined information from  
said building external shape information comparing/combining  
means.

28. The stereo image processing apparatus according to claim  
25 27, wherein said data correcting means comprises:

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25 image storing means for storing said image data.

map data storing means for storing said map data.

data storing means for storing modified three-dimensional  
data outputted from said data correcting means;

map data modifying means for modifying the map data stored in said map data storing means based on differential information obtained from said data comparing means.

33. The stereo image processing apparatus according to claim 27, wherein said flying object is an aircraft, and said image data is aircraft image data obtained from said aircraft.

34. A method of processing stereo images in which image data obtained from a flying object is subjected to stereo matching processing to generate three-dimensional data, comprising:

5 35. The method according to claim 34, wherein said step of  
correcting data to be corrected comprises the steps of:

15 36. The method according to claim 34, wherein said image data  
is obtained from image storing means for storing the image data.

37. The method according to claim 34, wherein said map data is obtained from map storing means for storing the map data.

38. The method according to claim 37, further comprising the  
20 steps of:

comparing the three-dimensional data stored in data storing means for storing modified three-dimensional data outputted from the step of correcting said data to be corrected with the modified

modifying the map data stored in said map data storing means based on differential information obtained from this comparison.

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extracting at least area information of land use on the map of roads/railroads/rivers/sea from map data including at least information of external shape of buildings; and

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superimposing said three-dimensional data with said area  
information;

5 information on said map data:

from the three-dimensional data included in the area;

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10 data; and
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data included in the area.

15 is obtained from image storing means for storing the image data.

is obtained from map storing means for storing the map data.

**steps of:**

20           comparing three-dimensional data stored in data storing  
means for storing modified three-dimensional data corrected in  
the step of correcting said data to be corrected with the modified  
three-dimensional data corrected in said step of correcting data  
to be corrected; and

46. The method according to claim 41, wherein said flying object is an artificial satellite, and said image data is satellite image data obtained from said artificial satellite.

48. A method of processing stereo images in which image data  
10 obtained from a flying object is subjected to stereo matching  
processing to generate three-dimensional data, comprising the  
steps of:

49. The method according to claim 48, wherein said step of correcting data to be corrected comprises the steps of:

setting, for each building in the superimposed map data, three-dimensional data included in the area within the external shape thereof as the candidate area of each building;

modifying, based on the statistic information in said each area, the three-dimensional data included in the area.

51. The method according to claim 48, wherein said flying object is an artificial satellite, and said image data is satellite image data obtained from said artificial satellite.

53. A method of processing stereo images in which image data obtained from a flying object is subjected to stereo matching processing to generate three-dimensional data, comprising the steps of:

comparing and combining the extracted information of  
20 external shape of buildings with the information of external  
shape of buildings obtained from map data including at least  
information of external shape of buildings; and



correcting erroneous data to be corrected including at least noises and losses in said three-dimensional data by using this combined information.

54. The method according to claim 53, wherein said step of  
5 correcting data to be corrected comprises the steps of:

superimposing said three-dimensional data on said combined information,

setting, for each building in the superimposed map data,  
three-dimensional data included in the area within the external  
10 shape thereof as the candidate area of each building;

obtaining, in this each set area, statistic information  
from the three-dimensional data included in the area; and

modifying, based on the statistic information in said each  
area, the three-dimensional data included in the area.

15 55. The method according to claim 53, wherein said image data  
is obtained from image storing means for storing the image data.

56. The method according to claim 53, wherein said map data  
is obtained from map data storing means for storing the map data.

57. The method according to claim 56, further comprising the  
20 steps of:

comparing three-dimensional data stored in data storing  
means for storing modified three-dimensional data corrected in  
the step of correcting said data to be corrected with the modified

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modifying the map data stored in said map data storing means based on differential information obtained from this comparison.

59. The method according to claim 53, wherein said flying object is an aircraft, and said image data is aircraft image data obtained from said aircraft.

extracting at least area information of land use on the  
15 map of roads/railroads/rivers/sea from map data including at  
least information of external shape of buildings;

comparing and combining the information of external shape  
20 of buildings obtained from said map information with the  
information of external shape of buildings extracted in said  
step of extracting said information of external shape of  
buildings; and

61. The method according to claim 60, wherein said step of  
5 correcting data to be corrected comprises the steps of:

setting, for each building in the superimposed map data,  
three-dimensional data included in the area within the external  
10 shape thereof as the candidate area of each building, and spatially  
dividing the three-dimensional data in accordance with the area  
information on said map data;

15           setting modification conditions of three-dimensional data  
corresponding to each area information of land use on said map  
data; and

62. The method according to claim 60, wherein said image data is obtained from image storing means for storing the image data.

63. The method according to claim 60, wherein said map data is obtained from map data storing means for storing the map data.

64. The method according to claim 63, further comprising the steps of:

comparing the three-dimensional data stored in data storing means for storing modified three-dimensional data corrected in the step of correcting said data to be corrected with the modified three-dimensional data corrected in the step of correcting said data to be corrected; and

modifying map data stored in said map data storing means based on differential information obtained from this comparison.

65. The method according to claim 60, wherein said flying object is an artificial satellite, and said image data is satellite image data obtained from said artificial satellite.

66. The method according to claim 60, wherein said flying object is an aircraft, and said image data is aircraft image data obtained from said aircraft.

67. A recording medium in which a program for processing stereo images is recorded for making a computer carry out stereo image processing for subjecting image data obtained from a flying object to stereo matching processing to generate three-dimensional data, wherein said program for processing stereo images makes said computer correct erroneous data to be corrected including at least noises and losses in the three-dimensional data by using at least information of external shape of buildings obtained from map data including at least the information of external shape of buildings.

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68. A recording medium in which a program for processing stereo images is recorded for making a computer carry out stereo image processing for subjecting image data obtained from a flying object to stereomatching processing to generate three-dimensional data, 5 wherein said program for processing stereo images makes said computer extract at least area information of land use on the map of roads/railroads/rivers/sea from map data including at least information of external shape of buildings, and correct erroneous data to be corrected including at least noises and 10 losses in said three-dimensional data by using the extracted area information.

69. A recording medium in which a program for processing stereo images is recorded for making a computer carry out stereo image processing for subjecting image data obtained from a flying object 15 to stereomatching processing to generate three-dimensional data, wherein said program for processing stereo images makes said computer analyze said image data to extract information of external shape of buildings, and correct erroneous data to be corrected including at least noises and losses in said 20 three-dimensional data by using the extracted information of external shape of buildings.

70. A recording medium in which a program for processing stereo images is recorded for making a computer carry out stereo image processing for subjecting image data obtained from a flying object 25 to stereomatching processing to generate three-dimensional data,

wherein said program for processing stereo images makes said computer analyze said image data to extract information of external shape of buildings, compare and combine the extracted information of external shape of buildings with the information of external shape of buildings obtained from map data including  
5 of external shape of buildings, and correct erroneous data to be corrected including at least noises and losses in said three-dimensional data by using this combined information.

10 71. A recording medium in which a program for processing stereo images is recorded for making a computer carry out stereo image processing for subjecting image data obtained from a flying object to stereo matching processing to generate three-dimensional data, wherein said program for processing stereo images makes said  
15 computer extract at least area information of land use on the map of roads/railroads/rivers/sea from map data including at least information of external shape of buildings, analyze said image data to extract information of external shape of buildings, compare and combine the information of external shape of buildings  
20 obtained from said map data with the information of external shape of buildings obtained from the analysis of said image data, and correct erroneous data to be corrected including at least noises and losses in said three-dimensional data by using the combined information.

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